MFP NANO PLUS

MFP filter test rigs from Palas® have already proved themselves worldwide in practical development and quality control applications. The MFP Nano *plus*has been specially designed to determine the separation efficiency of HEPA and ULPA filter media in accordance with DIN EN 1822-3 and ISO 29463-3. In the form of the U-SMPS, a modern and powerful nanoparticle measuring device with a measurement range from 5 nm to 1 µm is used for particle size and quantity analysis.

With the aid of the universal aerosol generator UGF 2000, defined aerosol distributions matched to the MMPS range can be produced with DEHS or salt (NaCl / KCl).

Thanks to the movable dilution cascades, the test rig can be changed from salt aerosols to DEHS aerosols within a very short time, with no need for cleaning.

OPERATION PRINCIPLE

FILTER MEDIA TEST RIG FOR DETERMINATION OF MPPS RANGE

The largely automated setup of the test sequence and the clearly defined individual components, and the individually adjustable sequence programs of the filter test software FTControl combine to deliver the high reliability of our measurement results.

The MFP filter test rig is a modular filter testing system for flat filter media and small mini-filters.
Pressure loss curves, fraction separation efficiency, or burden can be determined within a very short period – both reliably and cost-effectively.

1. Variable aerosol generation with the UGF 2000 for KCl / NaCl or DEHS. We integrated silica gel drying length. The volume flow for aerosol generation is individually regulated via mass flow controllers.

2. Aerosol neutralization: Soft x-ray Charger XRC 049 or Corona discharge (optional).

3. Mobile pneumatic filter holder for fast removal and loading of the test rig.

4. Movable dilution cascades:
The dilution cascades enable defined dilution of the applied test aerosol by the factors 10, 100, 1,000 and 10,000. As they are movable, the test rig can be changed over quickly from salt aerosols to DEHS aerosols. Lengthy or complex cleaning of the systems is not required.

Alternatively, the dilution system can be selected for only one test aerosol.

5. U-SMPS for nanoparticle measurement
The Palas® filter test software FTControl controls the U-SMPS and evaluates the data.

Adjustment of the aerosol distribution to the MPPS range

Through a suitable selection of the solution concentration, the generated particle size distribution is matched to the relevant MPPS range in the MFP Nano plus.

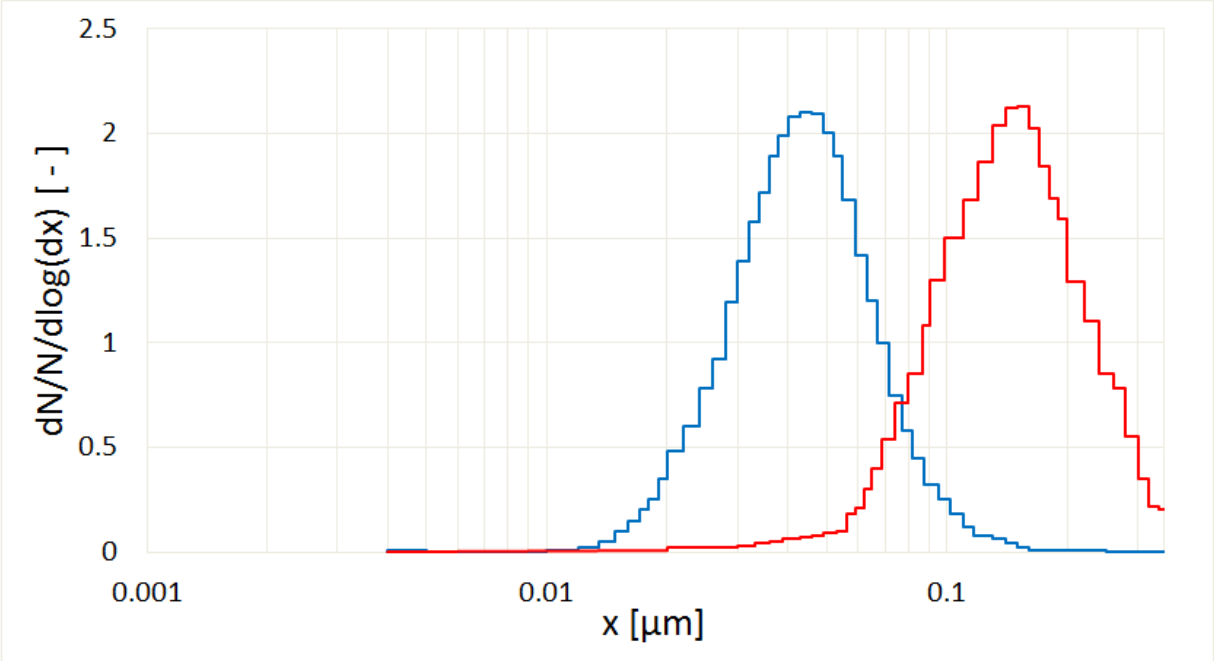

Fig. 1: Adjustment of the particle sizes for the required MPPS range with DEHS

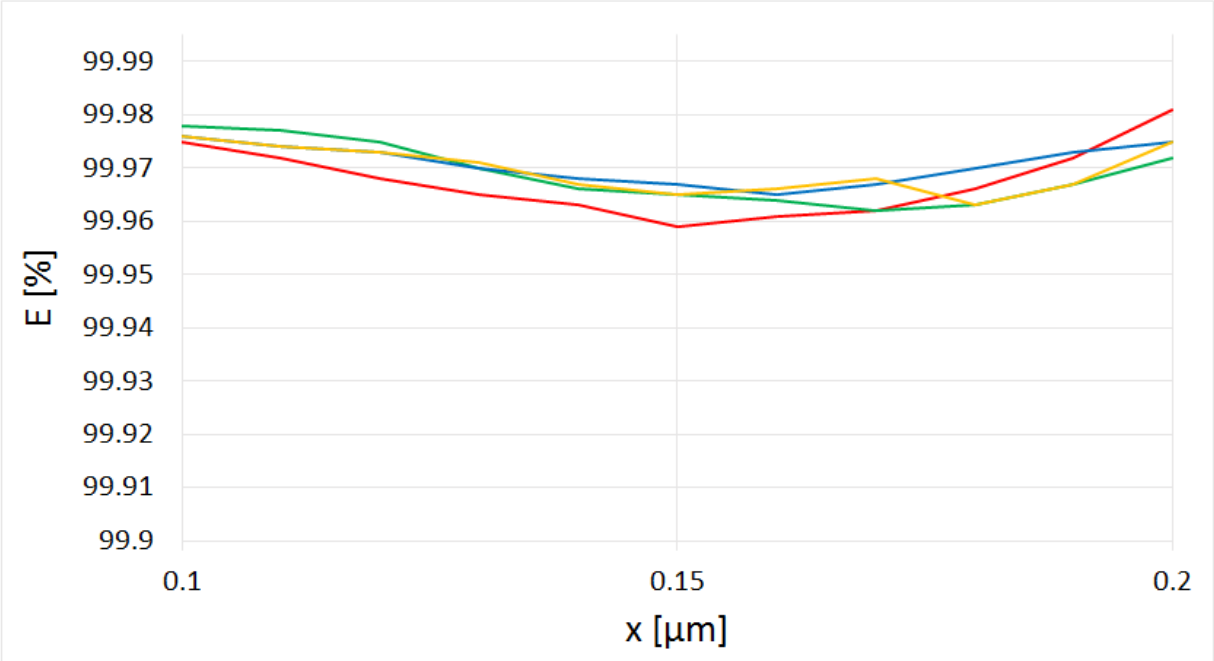

Fig. 2: Comparison of fraction separation efficiencies in the MPPS range at 140 nm

Automation:
The MFP Nano *plus* has integrated mass flow controllers to control the volume flow; these can be automatically monitored and controlled via the FTControl filter test software.
Sensor data such as the filter's volume flow and differential pressure are recorded automatically during the filter

test. The raw gas measurement is performed without the filter medium with a dilution factor matched to the separation efficiency (10, 100, 1,000 or 10,000). The clean gas measurement is then performed without dilution and with the filter medium inserted. The change in dilution factor is performed automatically.

Verification of the dilution factor:
The dilution systems integrated into the MFP Nano *plus* work like the tested VKL series with the ejector principle. The advantages of this dilution cascade are the apparent transfer behavior, low level of contamination, and simple cleaning.

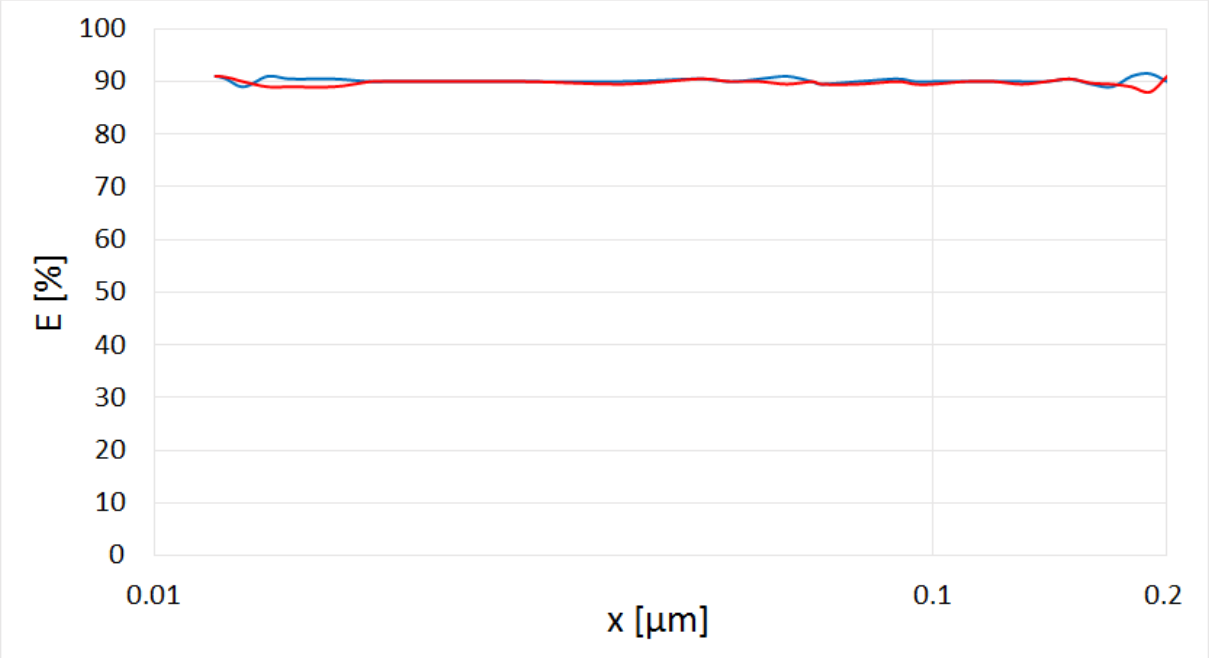

Fig. 3: Verification of the dilution factor via raw/clean gas comparison with a factor of 10 and NaCl particles

Literature

- Łukasz Werner a,*, Bartosz Nowak a, Anna Jackiewicz-Zag´orska a, Małgorzata Gołofit-Szymczak b, Rafał L. G´orny: Functionalized zinc oxide nanorods – polypropylene nonwoven composite with high biological and photocatalytic activity. www.sciencedirect.com/science/article/pii/S2213343723018183

Benefits

- Fractional separation efficiency measurement from 20 nm
- Internationally comparable measurement results in accordance with DIN EN 1822-3 and ISO 29463-3
- Simple use of different test aerosols, such as NaCl / KCl or DEHS (others on request)
- Easily movable dilution cascades with factors of 10, 100, 1,000 and 10,000 for measurements with salt or DEHS
- Simple measurement of the fraction separation efficiency and determination of the MPPS range
- High reproducibility of the testing method
- Flexible filter test software FTControl
- Easy to operate; even untrained personnel can be instructed quickly in the use of the equipment
- Cleaning can be performed autonomously by the customer
- Short set-up times, fast throughput times
- Mobile setup, easy to move on castors
- Validation of the clear function of individual components and the overall system during pre-delivery acceptance testing and upon delivery
- Reliable operation
- Low-maintenance
- Reduce operating costs

DATASHEET

Aerosols	Dusts (e.g., SAE dusts), salts (e.g., NaCl, KCl), liquid aerosols (e.g., DEHS)
Test area of the medium	100 cm^2
Measurement range (size)	U-SMPS: 10 – 800 nm
Volume flow	0.48 – 5.76 m^3/h - pressurized operation
Power supply	115 – 230 V, 50/60 Hz
Differential pressure measurement	0 – 2,500 Pa (others on request)
Inflow velocity	1.3 – 16 cm/s (others on request)
Compressed air supply	6 – 8 bar
Dimensions	Approx. 760 • 2,100 • 985 mm (H • W • D)

APPLICATIONS

- For filter media and small filter elements
- Product development and production control
- Test possibilities with regard to EN 1882-3 (HEPA/ULPA) and ISO 29463-3
- Fractional efficiency measurement in the range from approx. 20 nm up to 1 μm

Mehr Informationen:
https://www.palas.de/product/mfpnanoplusmodel